Re-evaluation of the Applicability of Agency Sample Holding Times

Brian Schumacher
Supervisory Physical Scientist
U.S. EPA Office of Research and Development/National Exposure Research Laboratory/Environmental Sciences Division (ESD)-Las Vegas/Characterization and Monitoring Branch (CMB)
(702) 798-2242
schumacher.brian@epa.gov

Authors: Brian Schumacher[1], Calvin C. Ainsworth[2], Eric A. Crecelius[3], and Valerie I. Cullinan[3]
[1]U.S. EPA ORD/NERL/ESD-LV/CMB
[2]Battelle Pacific Northwest Laboratory
[3]Battelle Marine Sciences Laboratory

Keywords: soil, sediment, holding time, heavy metals, organics

Holding times are the length of time a sample can be stored after collection and prior to analysis without significantly affecting the analytical results. Holding times vary with the analyte, sample matrix, and analytical methodology used to quantify the analyte's concentration. Maximum holding times (MHTs) have been established by the U.S. Environmental Protection Agency (U.S. EPA) and have been presented in the Code of Federal Regulations and SW-846 methods manual. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes. For this study, samples were collected, held, and analyzed after specific time periods (fractions or multiples of the MHTs) to evaluate the existing current holding times. Heavy metals, chromium (VI), pesticides, polyaromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) were examined in both sediment and soil matrices.

Contaminated soils and sediment samples were collected from across the U.S. via our regional partners and other supporting regional personnel. Samples were homogenized and preserved at either 4° or -20° C. Analyses were performed following standard SW-846 methods. Samples were analyzed at times 0, 0.5 MHT, 1 MHT, 2 MHT, and up to 12 MHT depending upon the contaminant being investigated. Linear regression models were used to determine holding time effects on sample concentrations.

Heavy metal concentrations remained steady through time. Cr(VI) concentrations remained steady through eight MHTs regardless of storage temperature. Storage temperature influenced the holding time of PAHs. At -20° C, no changes in PAH concentrations were identified. At 4° C, concentrations of the 3-ring PAHs decreased after about 30 days. Pesticide and PCB concentrations remained steady through six MHTs.

This project is a Region Methods Initiative project involving U.S. EPA Regions 1 and 10 and NERL/ESD/CMB scientists.

The results of this study will provide the Agency (i.e., regions and program offices) with independent scientific data on contaminant concentrational changes through time to allow for the reevaluation of the current holding times presented in the current regulations.

Notice: Although this work was reviewed by the U.S. EPA and approved for publication, it may not necessarily reflect official Agency policy.